The Magnitude System

Apparent Magnitudes

Physics 090

2020-02-19

SAINT MARY'S COLLEGE of CALIFORNIA

Topics

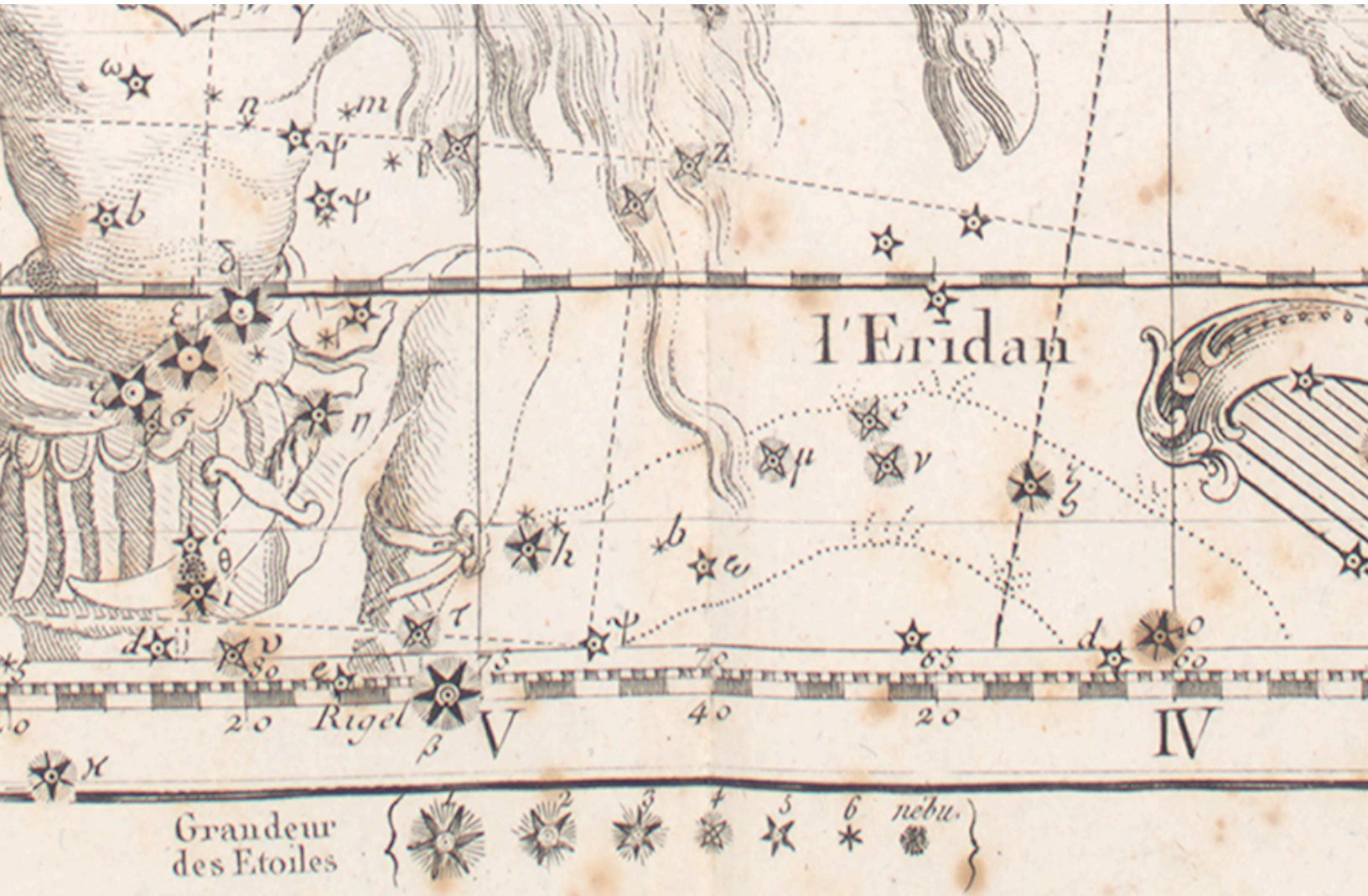
- Powers of 10
- Multiplication (add exponents)
- Division (subtract bottom exponent from top)
- Whacky exponents like $10^{1/2}$ and $100^{1/5}$
- $10^{1/2}$ is a whacky way of writing $\sqrt{10}$ because (using the add exponents rule) $10^{1/2} \times 10^{1/2} = 10^{1/2+1/2} = 10^1 = 10$
- Original Magnitude System:

  Around 129 B.C., "the Greek astronomer Hipparchus produced the first well-known star catalog. Hipparchus ranked his stars in a simple way. He called the brightest ones 'of the first magnitude,' simply meaning 'the biggest.' Stars not so bright he called 'of the second magnitude,' or second biggest. The faintest stars he could see he called 'of the sixth magnitude.'" —Sky & Telescope Magazine (skyandtelescope.com)

- Modern Magnitude System: every five steps (e.g., from 0 to 5 or from 1 to 6) is 100x dimmer. $100 = 10^2$. Each step is one fifth of that, so $10^{2/5}$. Vega is magnitude 0.
- $100^{1/5}$ a little more than 2.5, so each magnitude is a bit more than 2.5x dimmer. Try 2.5 x 2.5 x 2.5 x 2.5 x 2.5 in a calculator to check that five steps of 2.5 almost compounds to 100.
- Magnitude of Sirius: -1.46.
- Magnitude of Betelgeuse: Usually about 0.2, but it has faded to about 1.5.

Flamsteed (b.1646, d.1719), Greenwich Royal Astronomer, Atlas (1795 edition)

New York Public Library (nypl.org)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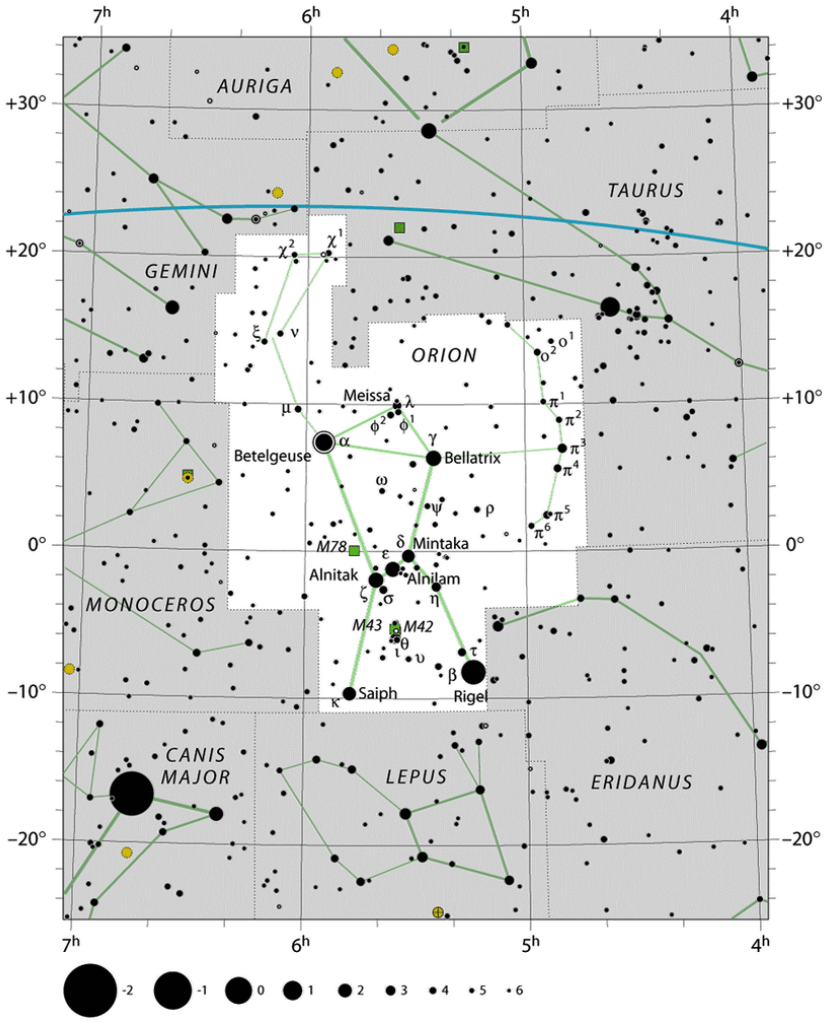
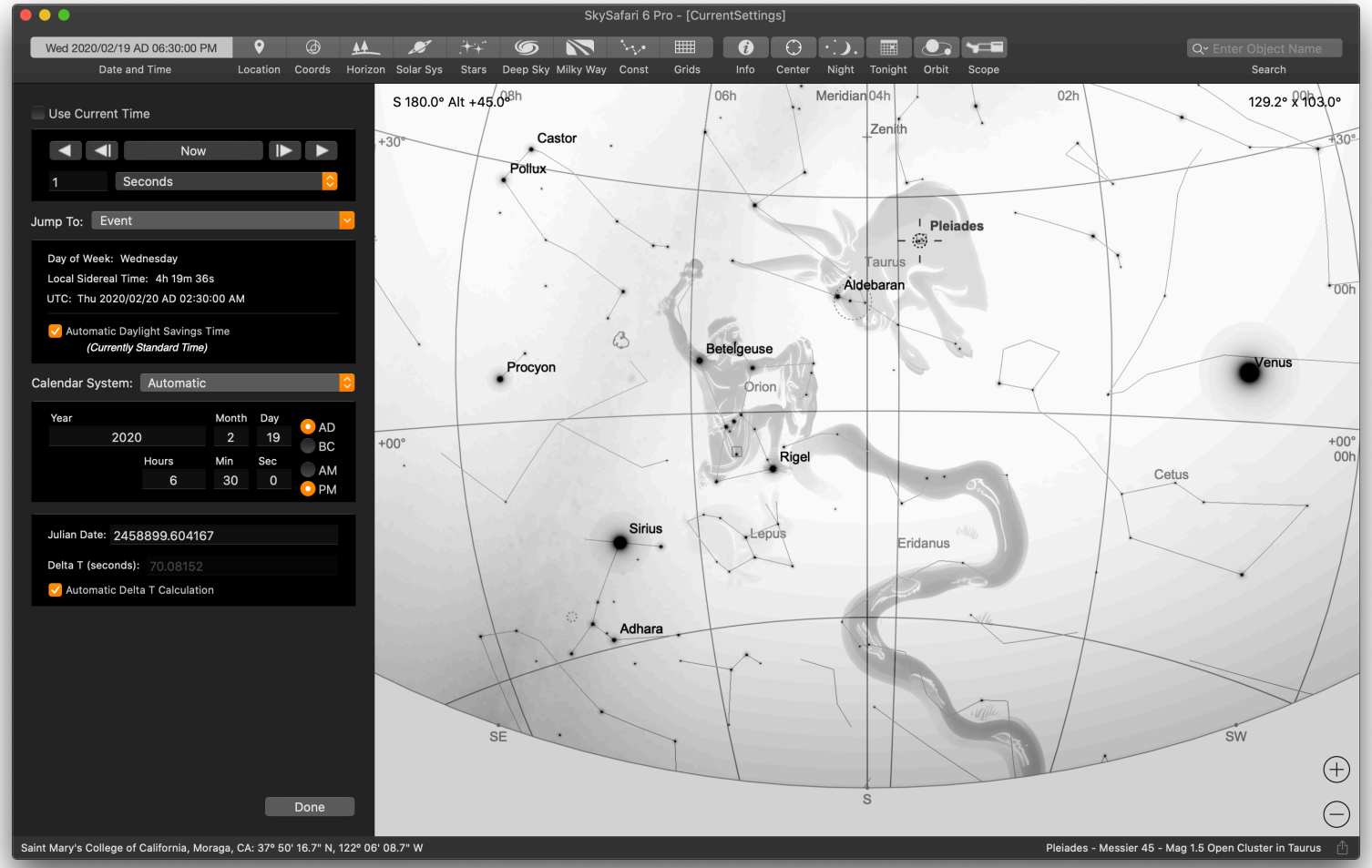
Modern Orion,Taurus and Canis Major Constellation Diagram

DW Hamacher / International Astronomical Union, "Observations of red-giant stars by Aboriginal Australians," 2017 (arxiv.org)





SkySafari Pro, Feb 19, 6:30pm, Moraga, Looking South